LUNAR-MONTHLY RAIN-FALL IN THE UNITED STATES.

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When the Meteorological Department of the Signal Service Bureau was first organized, I believed that the extent of territory embraced by the observations would soon furnish material for useful generalizations, in respect to the importance of climatic influences which many regard as either problematical, or wholly insignificant.

If any considerable improvement in our present system of weather forecasts should ever become possible, it will doubtless be brought about by a fuller understanding of cyclical changes. Howard and Sabine long ago showed that barometric pressure and magnetic force are sensibly affected by the moon, and the cumulative effect of undulations is such that the daily atmospheric tides, though singly of small magnitude, may, by regular succession, lead to such blendings of currents as will produce cyclical winds and storms. By my numerous comparative investigations I have shown that, while there is a great discrepancy in the forms of the lunar rain curves at different stations, the discrepancy is no greater than is found in the solar curves. I have also shown that there is a likeness between the curves for different independent periods, at the same station, which cannot be attributed to chance, such likeness being most striking, and the inflections of the curves being greatest where the lunar-tidal forces are strongest.

Any normal lunar, or planetary, wave-producing influence may be greatly obscured by local or accidental disturbances. The daily announcements of "probabilities" often seem to fail in a given locality, when the weather map shows that they are wonderfully verified in an entire region. So a lunar disturbance which would ordinarily bring rain, may be marked by cloud or wind at some stations, while, if we had reports from the entire district, we should find a general prevalence of rain. We may, therefore, look for results from observations at a large number of stations, extending over only a few years, analogous to those which would be shown in a long series of years, by the observations at a single station in the same district.

The influence of the Rocky Mountains upon our storms has been well known since the days of Redfield and Espy. The intersections of normal winds, near the base of those mountains, as well as the analogous intersections which occur in the West Indian birthplace of tornadoes, I have pointed out in a previous paper. In neighborhoods where there is a natural tendency towards a blending of currents, cumulative tidal influences may be supposed to have a special efficiency.

Influenced by these views, I have examined the morning weather maps for the past three years, tabulating, in accordance with the moon's age, both the number of reporting stations and the reported rain-fall upon

each map. I then divided the total rain-fall upon each day of the lunar month by the total number of stations reporting for the corresponding day, and took successive differences between the resulting averages, by Airy's method. The normals thus deduced are given in the accompanying table, together with the normals for various local curves. The curve deduced from 43 years' observations at Philadelphia, covers a longer period than any other to which I have had access in the United States, and its striking resemblance to the Signal Service curve is shown by the diagram. The resemblance is the more significant in view of the fact that the periods represented by the two curves are entirely independent. The flexures in the Philadelphia curve average about $1\frac{3}{5}$ days earlier than those of the general curve. On the hypothesis of cumulative tidal undulations, this would represent a daily difference of $1\frac{23}{45}$ hours, or $22\frac{2}{3}°$, a difference corresponding to disturbances originating in our Western territories.

Occasional breaks in my series of weather maps, the interference of storms with the transmission of reports, and other causes, combine to render these results imperfect, but their indications are of such a character as to convince me that a careful study of the full returns, which are forwarded thrice a day to the Signal Service Bureau, would lead to the discovery of important laws governing the lunar influence at various seasons of the year, at various periods of the day, and in various sections of the country.

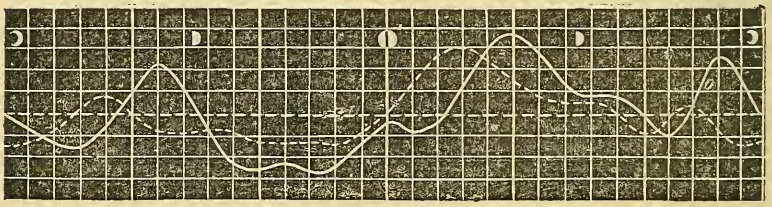
Lunar-Monthly Rain-fall, from Observations of Signal Service Bureau, and at Local Stations.

Lunar Day.	March, 1872 to Sept. 1873.	Sept. 1873 to April, 1875.	March, 1872 to April, 1875.	Philadelphia, 1825 to 1868.	San Francisco, 1849 to 1872.	Barbadoes 1847 to 1873.	Lisbon, 1854 to 1870.
1.....	105	96	100	93	97	90	106
2.....	106	88	96	94	97	79	106
3.....	101	86	94	97	94	77	99
4.....	99	87	92	102	92	84	90
5.....	98	94	96	103	96	89	85
6.....	104	104	103	100	104	88	83
7.....	111	110	111	97	107	85	84
8.....	106	108	107	96	108	82	89
9.....	97	102	97	96	107	86	93
10.....	85	94	89	96	103	93	98
11.....	93	84	87	95	97	99	105
12.....	100	79	88	94	99	106	118
13.....	95	81	87	94	110	110	128
14.....	87	87	87	94	125	107	126
15.....	87	97	93	96	138	98	118
16.....	91	103	98	100	134	93	117
17.....	87	102	96	106	115	96	126
18.....	87	105	97	113	105	103	135

Lunar-Monthly Rain-fall, from Observations of Signal Service Bureau, and at Local Stations—CONTINUED.

Lunar Day.	March, 1872 to Sept. 1873.	Sept. 1873 to April, 1875.	March, 1872 to April, 1875.	Philadelphia, 1825 to 1868.	San Francisco, 1849 to 1872.	Barbadoes 1847 to 1873.	Lisbon 1854 to 1870.
19.....	101	113	107	115	104	104	135
20.....	117	115	116	113	96	104	124
21.....	127	112	119	108	85	104	106
22.....	123	107	114	104	83	109	85
23.....	109	105	107	102	86	116	68
24.....	102	107	104	102	88	121	62
25.....	105	104	104	99	89	125	67
26.....	104	98	99	96	86	123	77
27.....	94	98	95	98	81	116	86
28.....	89	109	100	101	85	108	91
29.....	94	118	113	99	93	105	93
30.....	100	111	106	95	96	100	100

In the diagram each vertical space represents .05 of the mean rainfall; each horizontal space, a lunar day. The curves begin and end on the day of new moon. The Signal-Service curve for three years is the unbroken line; the Philadelphia curve for 43 years, the broken line.



Stated Meeting, January 1, 1875.

Present, 14 members.

Vice-President, Mr. Fraley, in the chair.

A letter accepting membership was received from Rawson W. Rawson, Esq., Governor of Barbadoes, dated Government House, Nov. 24, 1874.

Letters of acknowledgment were received from Royal In-